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G1M
Selected US specifications from IPC sub-class G01B

(54) Instrument for measurement of railway wheel profiles

(57) A railway wheel profile measuring instrument comprises two separate gauging probes having engaging tips 9, 13 for respectively engaging the surfaces of a master profile 11 and the wheel 1. A signal is produced proportional to the changes in the relative vertical distance between the tips as the tips traverse across the profiles. The master profile 11 may be represented by a mathematical function loaded into the memory of a microcomputer.

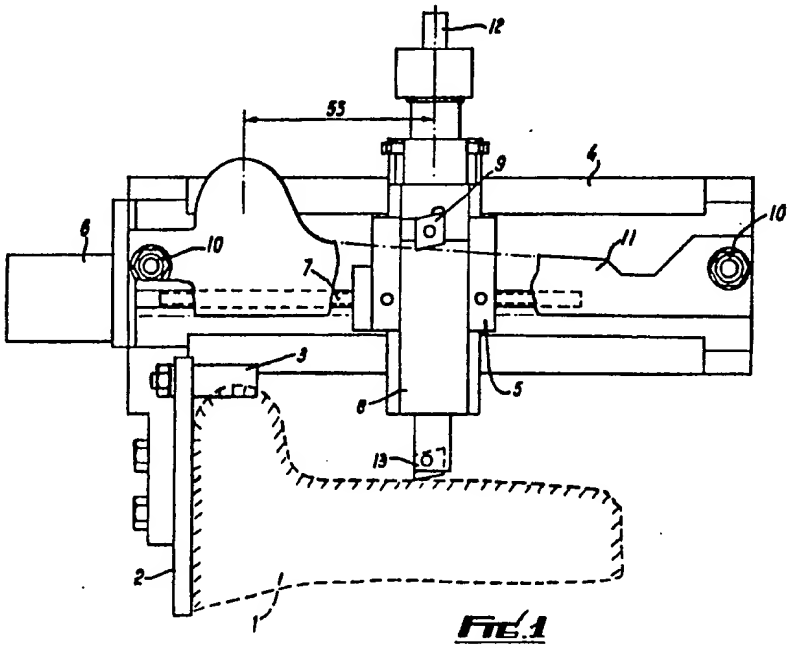

FIG.1

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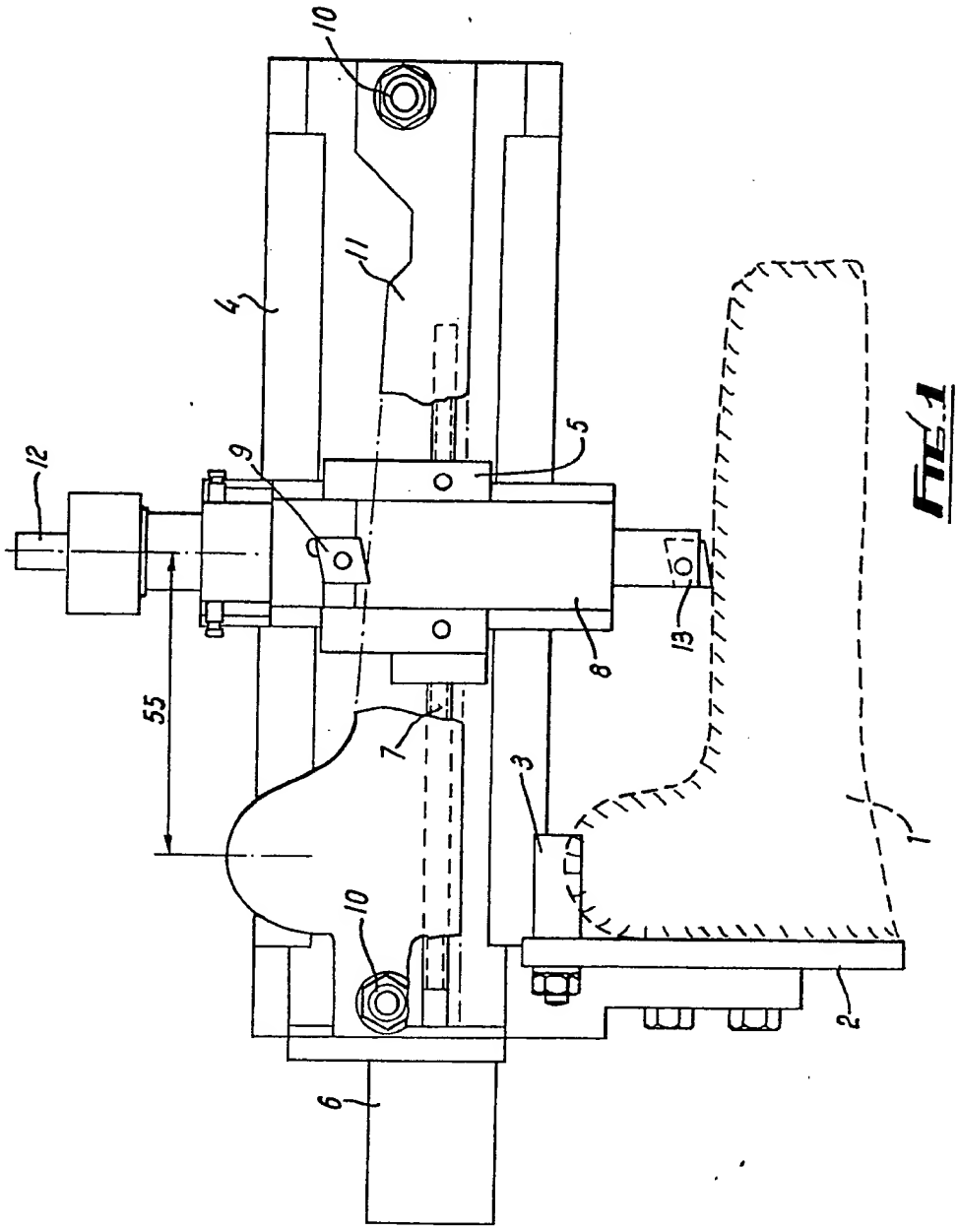

Fig.1

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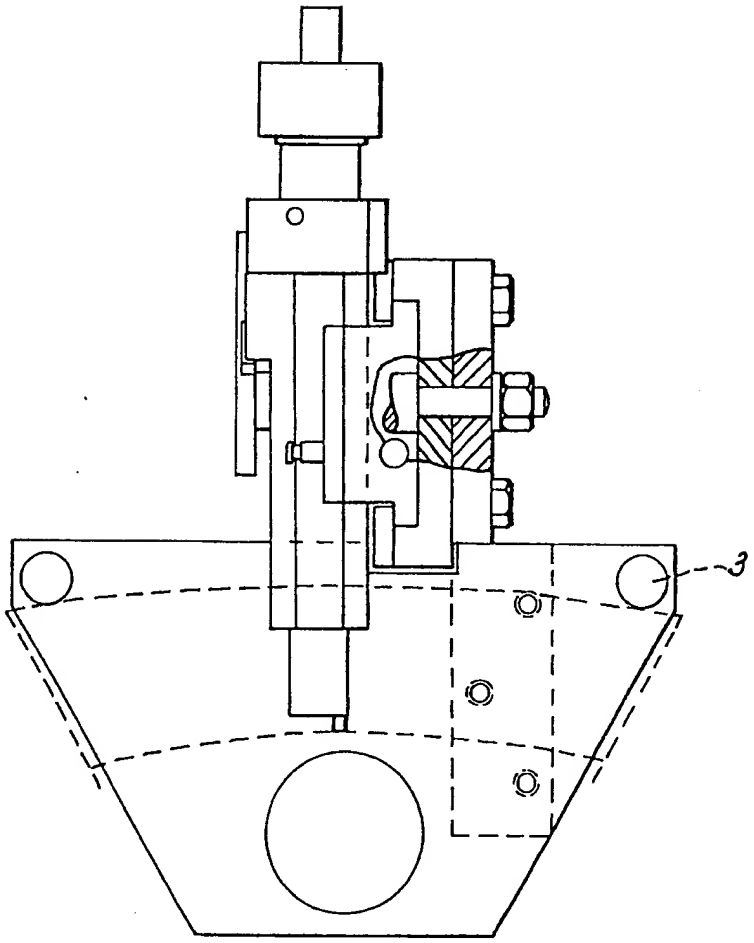

Фиг.2

SPECIFICATION

Instrument for measurement of railway wheel profiles

The invention relates to an instrument for measurement of the profile form and the standard dimensions of railway wheels. This kind of instrument is needed both for quality control of new railway wheels and for following of the wear of the wheel in use.

Hitherto mechanical slide calipers have been used for this purpose. Recording devices are also known for obtaining a diagram of the profile of the railway wheel. The diagram is then compared to the theoretical or to the profile previously obtained.

The drawback of these existing devices has been a lack of accuracy, which may easily lead to incorrect conclusions of, for example, the wear of the railway wheel. Furthermore, the known devices are clumsy in use. With this kind of measuring device it is not possible to obtain reliable results when, for example, one attempts to gain time by conducting wearing tests after relatively short driving distances.

This invention provides an improved measuring instrument for accurate measurement of the profile form and standard dimensions of the railway wheel easily, rapidly and also in field conditions. The primary application of the invention involves comparing the measures of the profile of railway wheel to those of a master profile continuously during the profile gauging.

According to the invention the railway wheel profile and the master profile are compared using a comparison gauging instrument, fixed with permanent magnets to the flangeside of the railway wheel. The master profile is fastened above the railway wheel surface under measurement and the gauging probes are moved along the profile surfaces in a lateral movement engaging tips scanning the surfaces of the railway wheel and the master profile. The gauging probes are placed on the same vertical line, the engaging tips touching the profile surfaces at equal distances from the reference points of the profiles. During the gauging the probe following the railway wheel profile effects an electric signal proportional to the deviations of the dimensions of the railway wheel and master profile. This difference signal can be amplified and recorded with a chart recorder.

By setting the instrument to zero at the highest point of the flange the difference signal will be directly proportional to the wear of the railway wheel.

The following of the railway wheel and master profile during the gauging can be effected by mechanical, optical, electrical, magnetic or pneumatic means.

The invention is further described by means of example and not in any limitative sense with reference to the accompanying drawings of which :–

Figure 1 is a side view of an instrument according to the invention fixed to the railway wheel; and

Figure 2 is a front view of the instrument in the normal direction towards the plane of the railway wheel.

In the following the construction and function of the preferred embodiment are presented by reference to the figures of the drawings. The gauging instrument is fixed to the railway wheel (1) under measurement by means of two permanent magnets mounted into the baseplate (2) in a manner that the guiding pins (3) rest against the outer rim and the base plate against the side face on the flange side of the railway wheel, which according to the standards acts as the reference surface in the dimensioning.

Because the outer rim of the railway wheel on which the pins (3) are resting does not wear in the use, it can also act as a reference diameter. The body of the instrument (4) is fixed at a right angle against the baseplate. The measuring carriage (5) is moved in a horizontal direction along the sliding rails on the body of the instrument by means of a nut placed into the carriage and of a screw spindle (7) rotated by a step motor (6).

Another measuring carriage (8) along the vertical sliding rails on the said measuring carriage moves in a vertical direction. The fixed probe (9) mounted to the last mentioned measuring carriage, follows the form of the upper surface of the master profile (11) mounted to the body of the measuring instrument by two pins (10). Thus the measuring carriage moves in a vertical direction according to the movements of the master probe when it is following the upper surface of the master profile (11).

A transducer movable in a vertical direction is embodied within the measuring carriage. A working probe (12), having an engaging tip (13) which follows the form of the railway wheel profile under measurement when the measuring carriage (5) is moved in horizontal direction is slidably supported within the measuring carriage.

The engaging tips of the gauging probes (9) and (13) are on the same vertical line and thus are always at an equal distance from the reference surface.

Due to the working principle of the working probe the variations of the output signal from the working probe are proportional to the variations in the mutual distance of the engaging tips. When the measurement is started the gauging tips are positioned on the highest point of the flange by moving the measuring carriage (5). The signal from the working probe is set to zero at this point. The measuring is accomplished by moving the engaging tips to

a proper distance from the reference point (The measuring distance 55mm depicted in Fig. 1 corresponds to the running circle according to UIC-standard).

The output signal from the work probe is then directly proportional to the height difference between the master profile and railway wheel profile and thus to the amount of wear of the railway wheel. The measurement can be repated at different points of the profile and at the circumference of the railway wheel for obtaining a clear insight of the distribution of the wear in different parts of the wheel. The measuring instrument of the invention can be applied for measurement of railway wheels according to various standards simply by changing the master profile to correspond to that standard. The measuring and recording of the results can be automated with the measuring instrument according to the present invention by using e.g. a microcomputer and by storing the results of the measurements made in the field conditions into the memory of the microcomputer for later analyses.

In another embodiment of the invention the master profile (11) can be compensated by a mathematical function loaded into the memory of a microcomputer. The measuring carriage (8) is then moved in vertical direction by means of a microcomputer actuated step motor turning the screw spindle and by means of a nut mounted in the measuring carriage, in a manner that the position of the measuring carriage (8) corresponds to the height of the master profile to the corresponding distance of the reference surface.

With the measuring instruments of the invention one easily obtains a great amount of accurate measuring results of e.g. wearing of the railway wheel.

In measurements accomplished the measuring accuracy has been 0.03mm when the wear depth has been from 0 to 10 mm. The maintenance turning of the railway wheel can be accomplished much more economically than before when based on measurements with the instrument according to the present invention.

CLAIMS

1. A gauging instrument for determination of the accurate form of a railway wheel profile comprising two separate gauging probes having engaging tips for engaging the surface of the railway wheel profile and the surface of a master profile simultaneously and producing a measuring signal proportional to the changes in mutual distance in vertical direction of the said engaging tips.

2. A gauging instrument according to claim 1 wherein said engaging tips are situated on the same vertical line.

3. A gauging instrument according to claim 2 wherein the gauging instrument is firmly fixed to the railway wheel during the measurement and the engaging tips are moving in lateral direction with respect to the railway wheel profile and the master profile.

4. A gauging instrument according to claim 1 wherein the master profile is compensated by a mathematical function loaded into the memory of a microcomputer and the vertical position of the measuring carriage (8) is controlled by said function when the railway wheel profile is engaged by engaging tips (13).

5. A gauging instrument substantially as hereinbefore described with reference to the accompanying drawings.

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